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Lee

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(54) **DEFLECTION YOKE HAVING MAGNETS ON THE TOP AND BOTTOM OF THE FLANGE PORTION OF THE HOLDER**

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(52) **U.S. Cl.** **313/440**; 313/430; 35/210; 35/211; 35/213
(58) **Field of Search** ..... 313/440–441, 313/421, 429, 430, 431, 432, 433–435, 461, 477 R, 479; 335/210, 211, 212, 213; 358/248, 249

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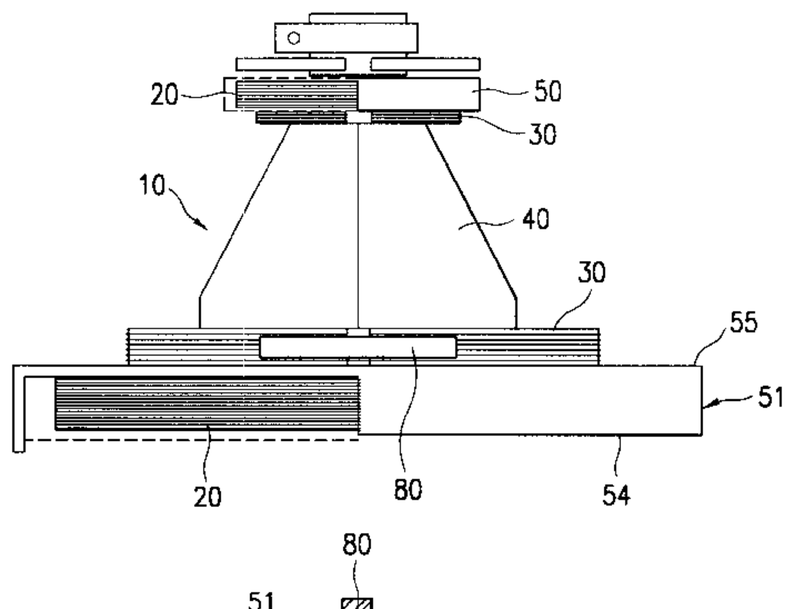
(57) **ABSTRACT**

Deflection yoke for a cathode ray tube including horizontal and vertical deflection coils for deflection of electron beams emitted from an electron gun in horizontal and vertical directions, respectively, a ferrite core disposed to surround the vertical deflection coil for improving a magnetic efficiency, an holder adapted to fix positions of the horizontal and vertical deflection coils and the ferrite core and insulate the horizontal and vertical deflection coils, and a magnet provided on an upper side and a lower side of a flange part formed at a screen side of the holder for cancelling a magnetic field leaked from the horizontal deflection coil at the screen side of the holder.

10 Claims, 7 Drawing Sheets



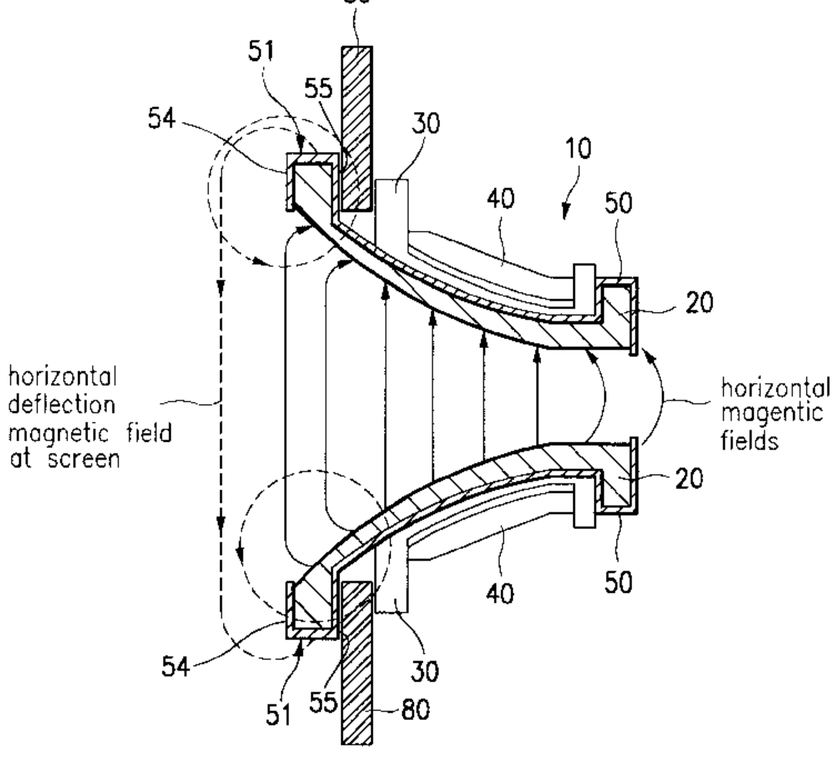


FIG. 1
Prior Art

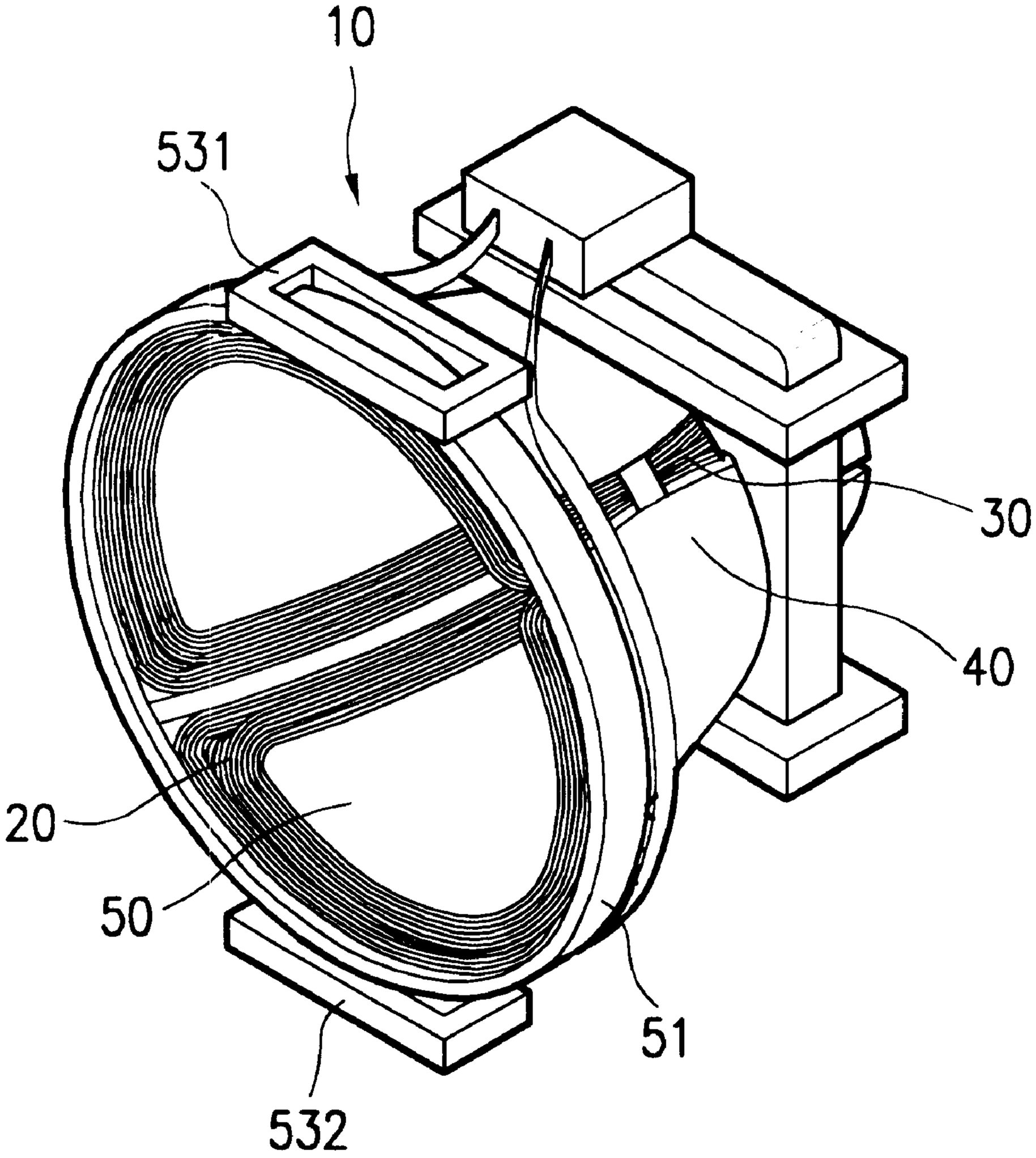


FIG. 2
Prior Art

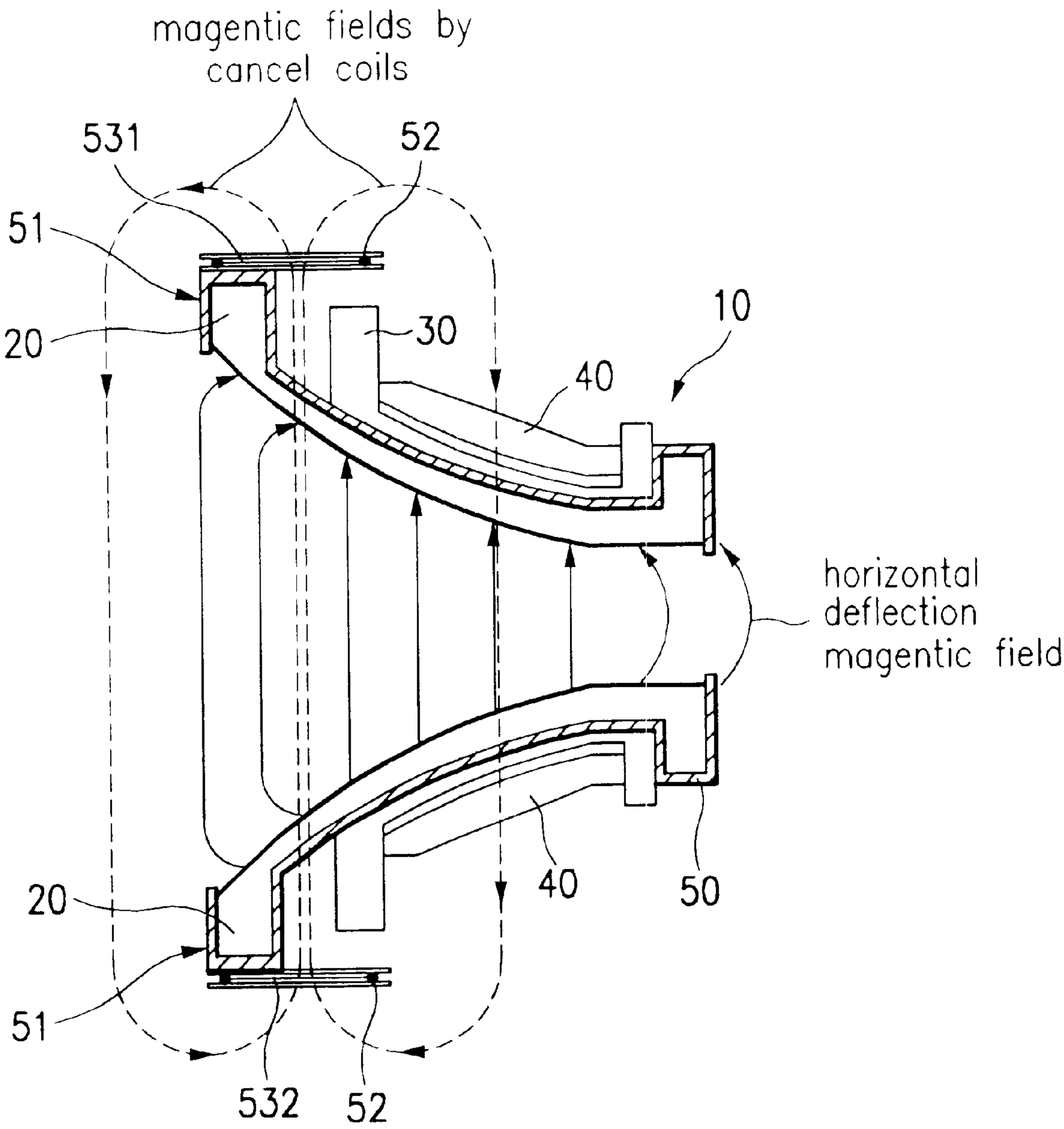


FIG. 3
Prior Art

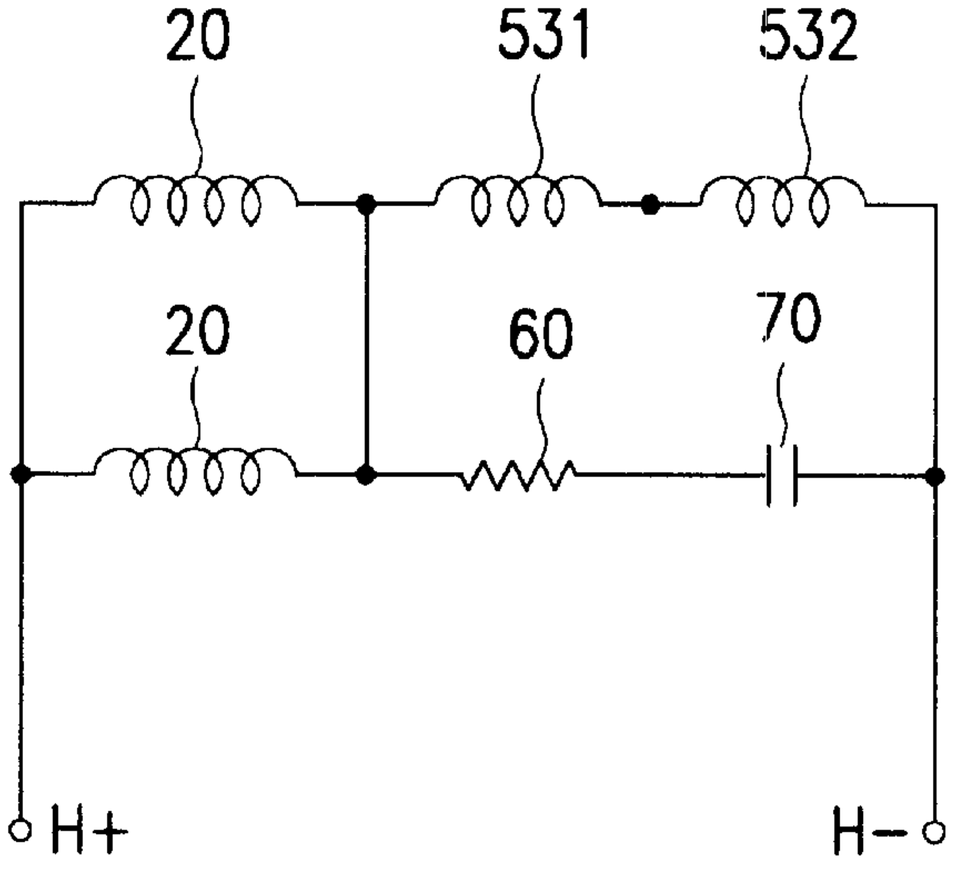


FIG. 4
Prior Art

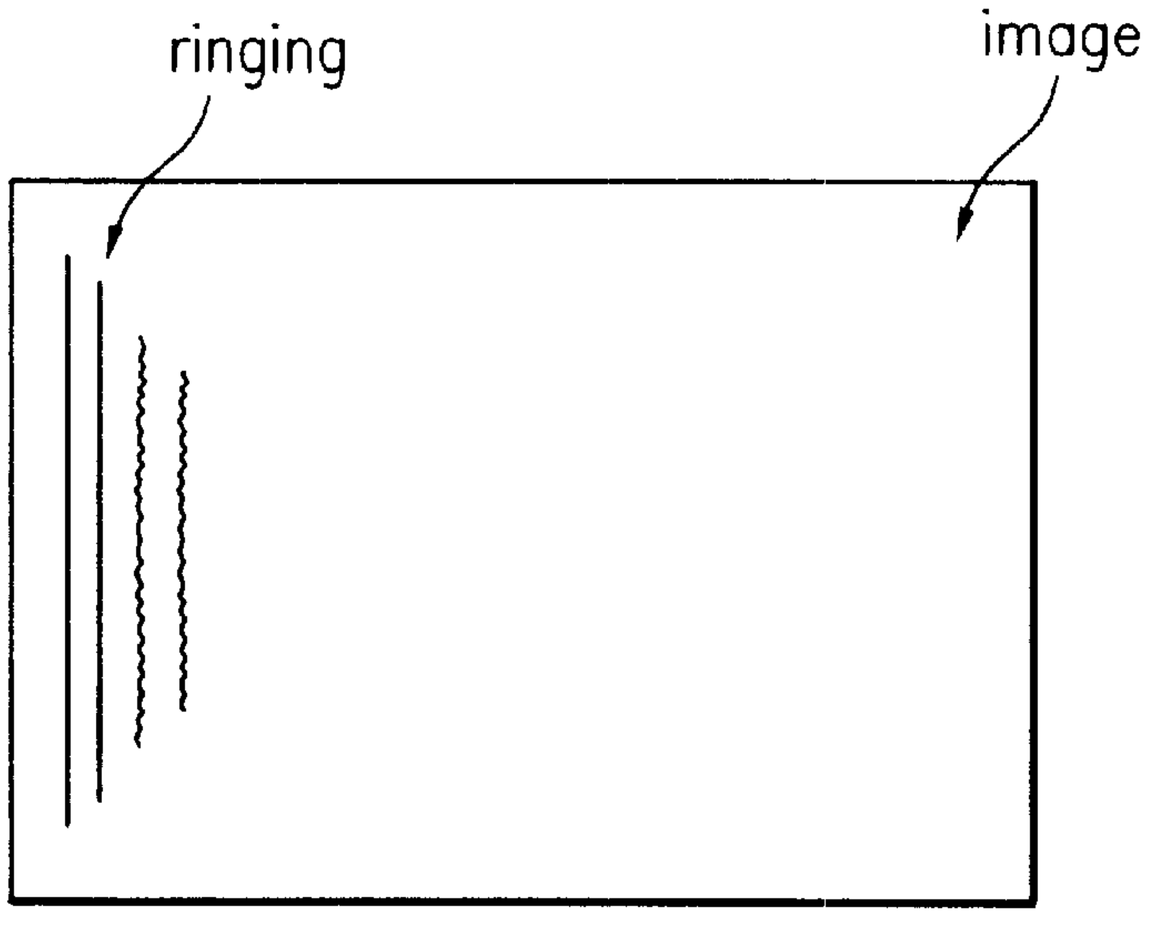


FIG. 5

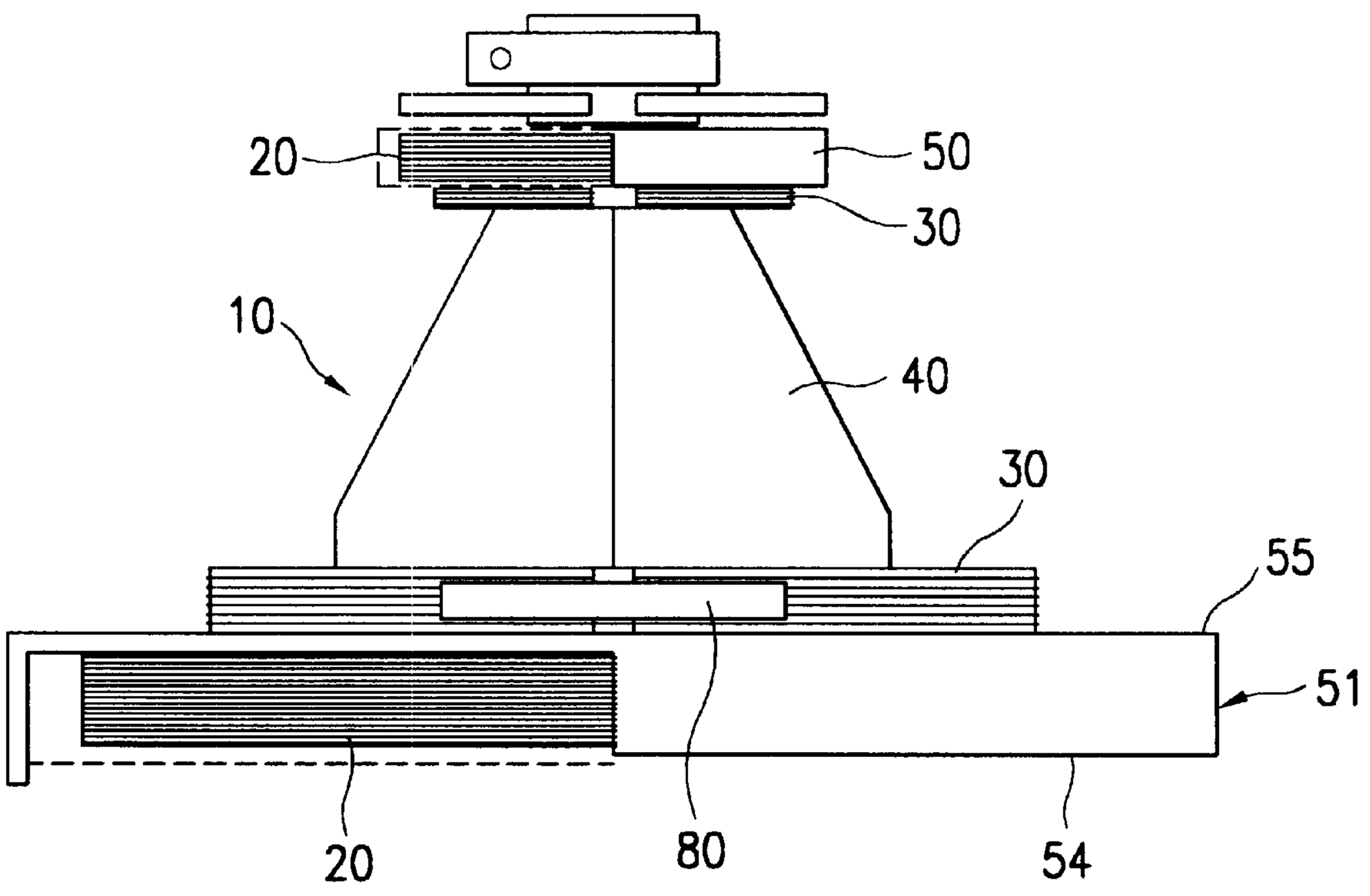


FIG. 6

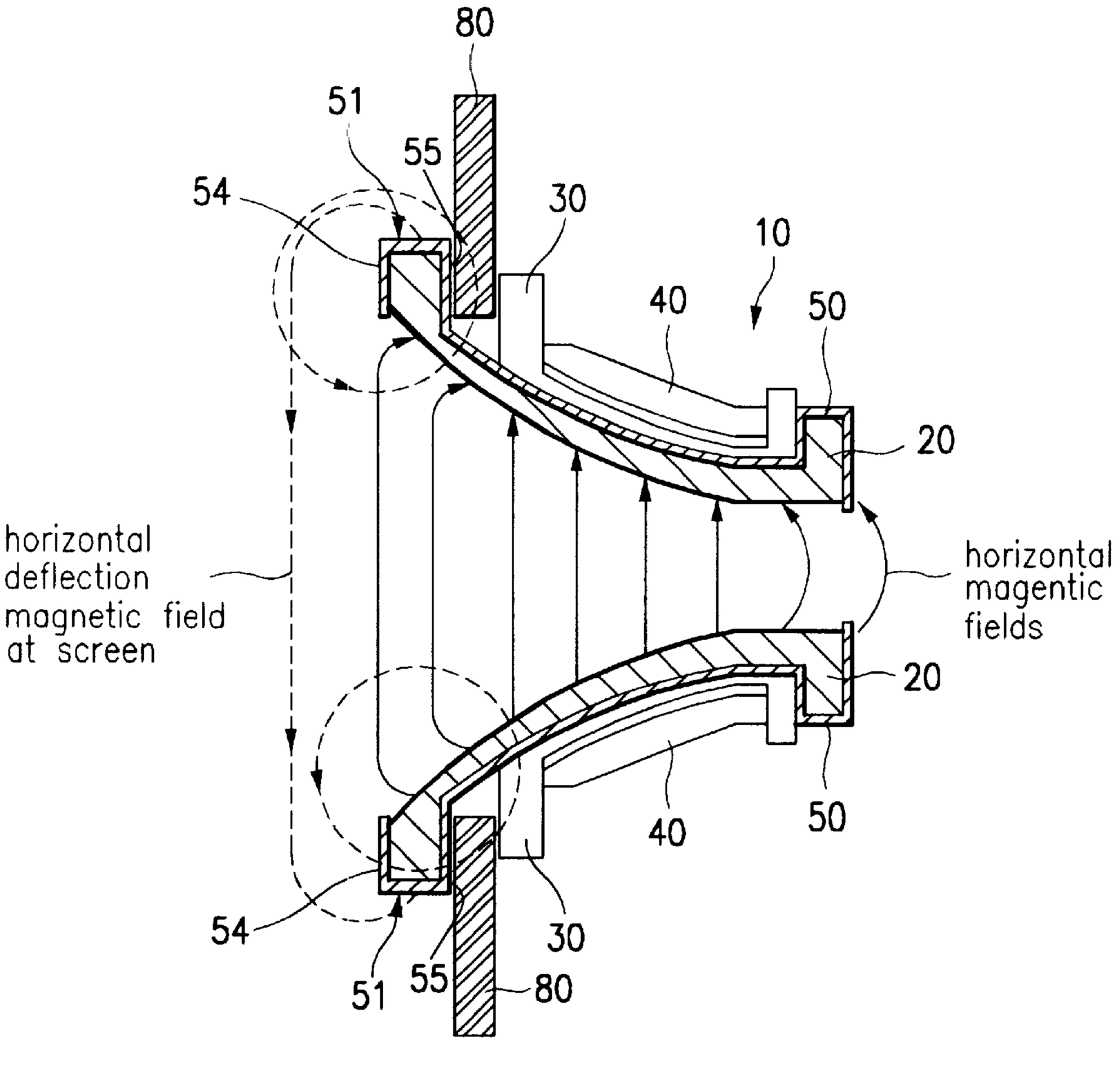

80
51
55
54
30
10
40
50
20
horizontal deflection magnetic field at screen
horizontal magentic fields
20
50
40
54
30
51
55
80

FIG. 7

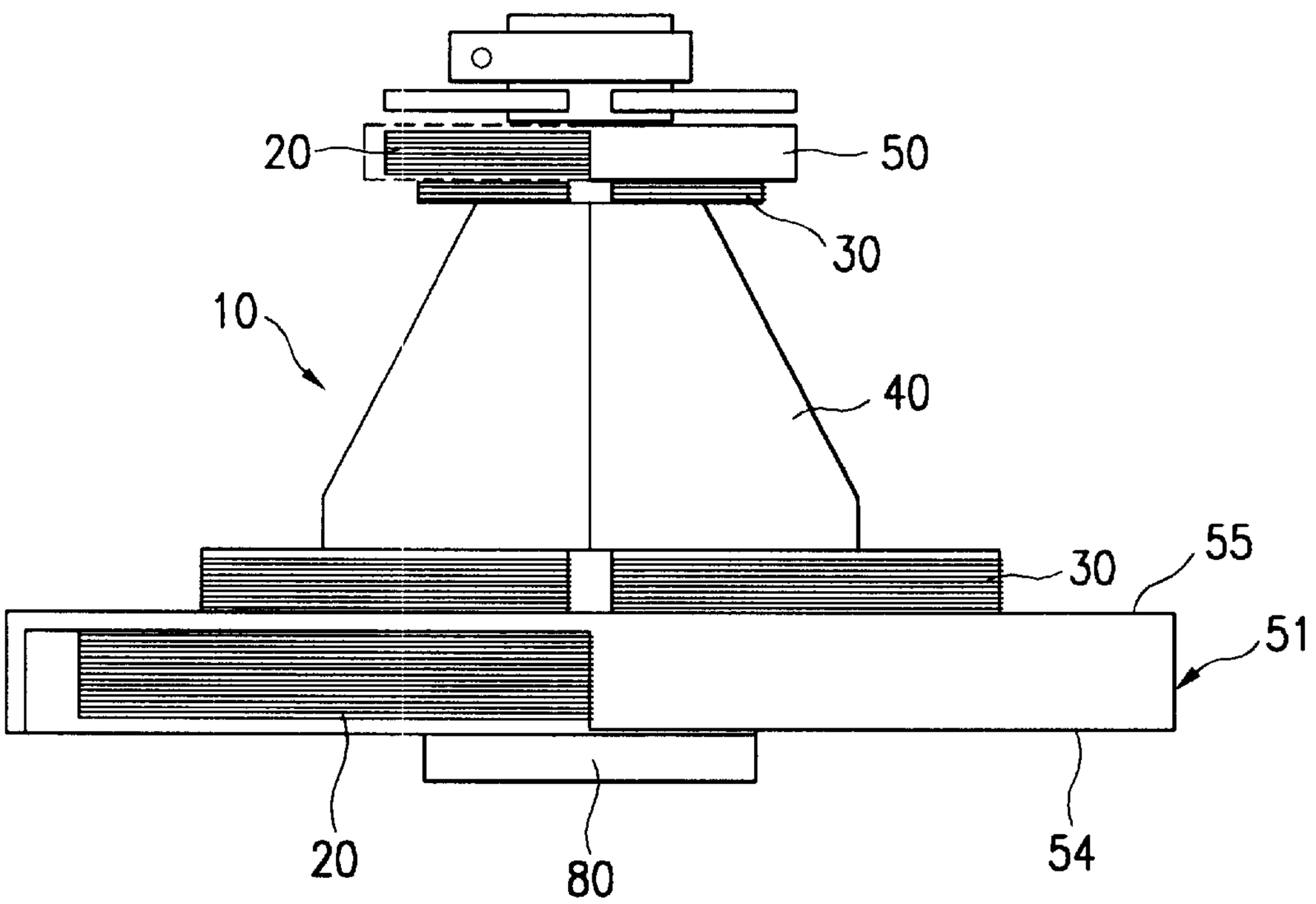


FIG. 8A

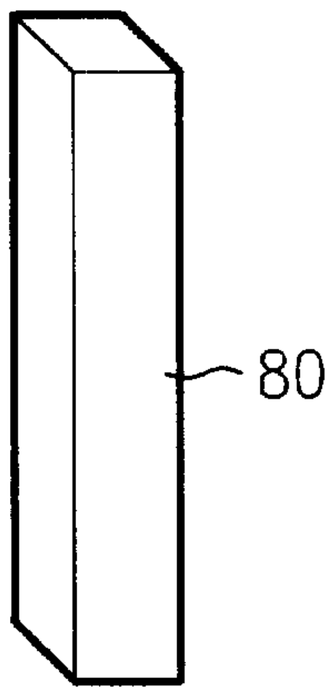


FIG. 8B

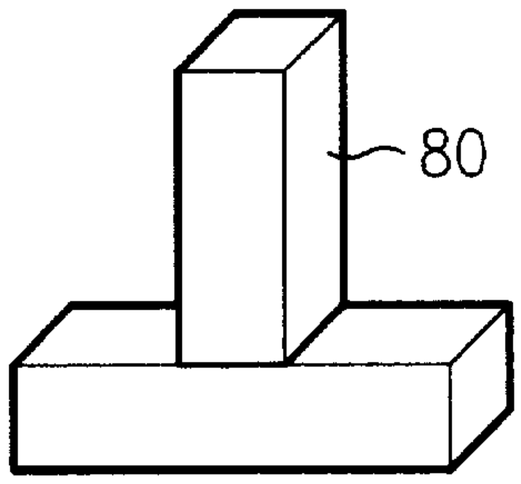
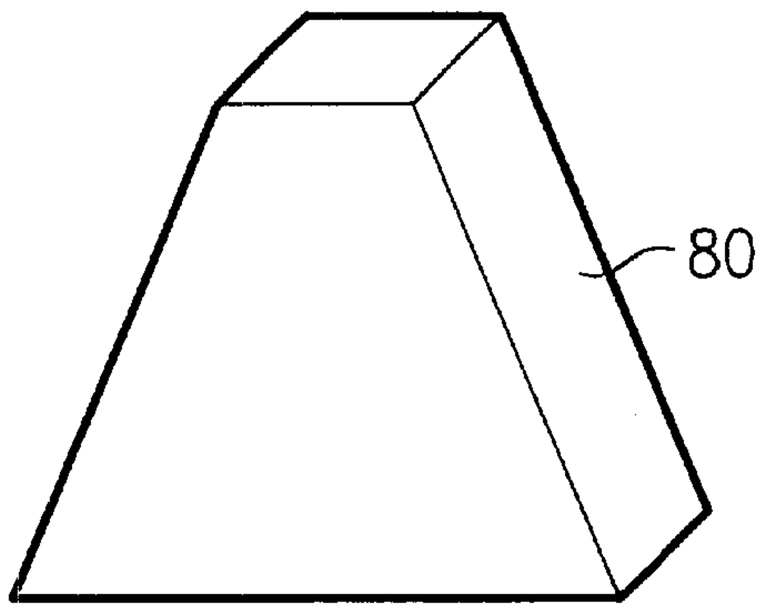


FIG. 8C



DEFLECTION YOKE HAVING MAGNETS ON THE TOP AND BOTTOM OF THE FLANGE PORTION OF THE HOLDER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a deflection yoke for a cathode ray tube, and more particularly, to a saddle-saddle type deflection yoke for a cathode ray tube, which has a magnet for canceling a leakage magnetic field coming from the deflection yoke.

2. Background of the Related Art

A related art deflection yoke has a horizontal deflection coil having a current of very low frequency of 15.75 KHz or over applied there to synchronous to a video signal and a vertical deflection coil **30** having a current of extreme low frequency applied thereto. The vertical and horizontal deflection coils having the current applied there to generate vertical and horizontal magnetic fields respectively, to deflect electron beams emitted from the electron gun to a given region on a screen. In the meantime, because the magnetic field from the current of the very low frequency might harm the human body, there have been many suggestions which can prevent leakage of magnetic field from the cathode ray tube caused by the very low frequency current.

FIG. **1** illustrates a perspective view of a related art deflection yoke for a cathode ray tube disclosed in Korea Patent publication No. 96-7241, and FIG. **2** illustrates a longitudinal section of the deflection yoke in FIG. **1**, schematically.

Referring to FIGS. **1** and **2**, the related art deflection yoke **10** is provided with horizontal and vertical deflection coils **20** and **30** for deflecting electron beams emitted from an electron gun, a ferrite core **40** disposed to surround an outer side of the vertical deflection yoke for improving a magnetic efficiency, a holder **50** for fixing positions of the horizontal and vertical deflection coils **20** and **30** and the ferrite core **40** and insulating between the horizontal and vertical deflection coils **20** and **30**, and cancel coils **531** and **532** wound on bobbins **52** respectively fitted to an upper side and lower side of a flange formed on a screen side of the holder **50**.

FIG. **3** illustrates a circuit showing connection of the horizontal deflection coil **20** and the cancel coils **531** and **532**.

Referring to FIG. **3**, each of the cancel coils **531** and **532** is connected to a circuit of the horizontal deflection coil **20**, and is connected in series. The cancel coils **531** and **532** are connected to the horizontal deflection coil **20** for generating magnetic fields from a screen side of the holder **51** opposite to the leakage magnetic field generated in the horizontal deflection coil **20**. According to this, as shown in FIG. **2**, the cancel coils **531** and **532** can cancel the leakage magnetic field from the horizontal deflection coil **20** at the screen side of the deflection yoke **10** for preventing leakage of the magnetic field of the horizontal deflection coil.

However, the related art cancel coils **531** and **532** has the following problems.

First, as inductances of the cancel coils **531** and **532** are added to an inductance of the horizontal deflection coil **20**, the inductance of the horizontal deflection coil **20** should be reduced, which drops a horizontal deflection power of the horizontal deflection coil, to reduce a size of an image. However, if a horizontal deflection current is increased for enlarging the image size, a heat generation characteristic of the deflection yoke **10** is deteriorated, to drop a performance of the deflection yoke **10**.

Second, during the horizontal deflection current is fed back, a current charged in the cancel coils **531** and **532** wound on the bobbins **52** is discharged. FIG. **4** illustrates an example of ringing of an image caused by discharge of a current from the cancel coils **531** and **532**. Though the ringing may be prevented by providing a resistor **60** and a condenser **70** parallel to the cancel coils **531** and **532**, it results increased numbers of components and production man-hours.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a deflection yoke for a cathode ray tube that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide a deflection yoke for a cathode ray tube, which causes no performance drop and can cancel a leakage magnetic field coming from a deflection yoke without addition of any components.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, the deflection yoke for a cathode ray tube includes horizontal and vertical deflection coils for deflection of electron beams emitted from an electron gun in horizontal and vertical directions, respectively, a ferrite core disposed to surround the vertical deflection coil for improving a magnetic efficiency, a holder adapted to fix positions of the horizontal and vertical deflection coils and the ferrite core and insulate the horizontal and vertical deflection coils, and a magnetic material provided on an upper side and a lower side of a flange part formed at a screen side of the holder for canceling a magnetic field leaked from the horizontal deflection coil at the screen side of the holder.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention:

In the drawings:

FIG. **1** illustrates a perspective view of a related art deflection yoke;

FIG. **2** illustrates a longitudinal section of the deflection yoke in FIG. **1**, schematically;

FIG. **3** illustrates a circuit showing connection of the horizontal deflection coil and cancel coils;

FIG. **4** illustrates an example of ringing of an image caused by discharge of a current from cancel coils;

FIG. **5** illustrates a deflection yoke in accordance with one preferred embodiment of the present invention;

FIG. **6** illustrates a longitudinal section of the deflection yoke shown in FIG. **5**;

FIG. **7** illustrates a deflection yoke in accordance with another preferred embodiment of the present invention; and

FIGS. **8**A~**8**C illustrate perspective views of various magnets in accordance with preferred embodiments of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. FIG. **5** illustrates a deflection yoke in accordance with one preferred embodiment of the present invention, and FIG. **6** illustrates a longitudinal section of the deflection yoke shown in FIG. **5**. As the deflection yoke for a cathode ray tube of the present invention is identical to the related art deflection yoke for a cathode ray tube except the cancel coils and the cancel circuit of the related art, components of the present invention identical to the related art are given the same reference numerals.

Referring to FIG. **6**, the deflection yoke **10** in accordance with one preferred embodiment of the present invention includes horizontal and vertical deflection coils **20** and **30** for deflection of electron beams emitted from an electron gun in horizontal and vertical directions, a ferrite core **40** disposed to surround the vertical deflection coil for improving a magnetic efficiency, a holder **50** adapted to fix positions of the horizontal and vertical deflection coils **20** and **30** and the ferrite core **40** and insulate the horizontal and vertical deflection coils **20** and **30**, and one pair of magnetic materials **80** provided on an upper side and a lower side of a flange **51** formed at a screen side of the holder **50** for canceling a magnetic field leaked from the horizontal deflection coil **20** at the screen side adjacent to a screen which is one end of the holder **50**. The magnetic materials **80** are mounted on upper and lower parts **55** of the holder **50** right behind the flange **51** at the screen side of the holder **50** to position the magnetic materials **80** in a magnetic field region of the horizontal deflection coil **20** and **30** leaking toward the screen side and disposed to generate a magnetic field of a polarity opposite to the magnetic field from the horizontal deflection coil **20**, for canceling the magnetic field leaking toward the screen side as shown in FIG. **7**. It is preferable that the magnetic material **80** has a height greater than a height of the flange **51** for adequate cancellation of leakage of horizontal deflection magnetic field. It is also preferable that the magnetic material **80** is selected from the group Ni—Zn, Mg—Zn and Mn—Zn and the range of magnetic permeability of the magnetic material **80** is between 500–3000 H/m. As one specific embodiment of the present invention, when a magnetic materials **80** of hexahedral ferrite core with a size of 16 mm×60 mm×7 mm is applied to the deflection yoke **10** of the present invention, it is measured that leakage of magnetic field is reduced by approximately 44% compared to the related art.

FIG. **7** illustrates a deflection yoke for a cathode ray tube in accordance with a second preferred embodiment of the present invention, wherein magnetic materials **80** are mounted on upper and lower parts **55** of the holder **50** in front of the flange **51** and disposed to generate a magnetic field of a polarity opposite to the magnetic field from the horizontal deflection coil **20**, for canceling a horizontal deflection magnetic field leakage according to a principle as shown in FIG. **7**

FIGS. **8**A~**8**C illustrate perspective views of various magnets in accordance with preferred embodiments of the

present invention, wherefrom it can be known that a shape of the magnet **80** may be varied with a shape of the deflection coil.

The deflection yoke for a cathode ray tube of the present invention has the following advantages.

The capability of independent cancellation of the leakage magnetic field without connection to the horizontal deflection coil by the magnets of the present invention, eliminating the requirement for a reduction of an inductance of the horizontal deflection coil as in the case of the related art coils, allows to prevent a drop of a horizontal deflection power of the horizontal deflection coil.

And, since the deflection yoke for a cathode ray tube of the present invention is provided with magnets instead of coils connected to the horizontal deflection coil, the deflection yoke for a cathode ray tube of the present invention causes no ringing during a feed back time period of a horizontal deflection, and can reduce production cost and man-hours because no resistor and no condenser are required for preventing the ringing.

It will be apparent to those skilled in the art that various modifications and variations can be made in the deflection yoke for a cathode ray tube of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. A deflection yoke for a cathode ray tube comprising:

horizontal and vertical deflection coils for deflection of electron beams emitted from an electron gun in horizontal and vertical directions, respectively;

a ferrite core disposed to surround the vertical deflection coil for improving magnetic efficiency;

a holder adapted to fix positions of the horizontal and vertical deflection coils and the ferrite core and insulate the horizontal and vertical deflection coils; and,

a magnetic material provided on an upper side and a lower side of a flange part formed at a screen side of the holder for canceling a magnetic field leaked from the horizontal deflection coil at the screen side of the holder, wherein the magnetic material is formed of ferrite selected from the group consisting of Ni—Zn ferrite, Mg—Zn ferrite, and Mn—Zn ferrite.

2. A deflection yoke as claimed in claim **1**, wherein the magnetic material is disposed on a front part of the flange part.

3. A deflection yoke as claimed in claim **1**, wherein the magnetic material is disposed on a part behind the flange part.

4. A deflection yoke as claimed in claim **1**, wherein the magnetic material has a height greater than a height of the flange part.

5. A deflection yoke as claimed in claim **1**, wherein the range of magnetic permeability of the magnetic material is between 500–3000 H/m.

6. A deflection yoke as claimed in claim **1**, wherein the magnetic material is rectangular hexahedral.

7. A deflection yoke as claimed in claim **1**, wherein the magnetic material is trapezoidal hexahedral.

8. A deflection yoke as claimed in claim **1**, wherein the magnetic material is a 'T' form.

9. A deflection yoke as claimed in claim **1**, wherein the magnetic material is provided adjacent between the flange and the vertical deflection coil.

10. A deflection yoke for a cathode ray tube comprising:

a horizontal deflection coil for deflection of electron beams emitted from an electron gun in a horizontal direction;

a vertical deflection coil having a shallow trench, disposed to surround the horizontal deflection coil for deflection of electron beams emitted from an electron gun in a vertical direction;

a ferrite core inlaid in said shallow trench, disposed to surround the vertical deflection coil for improving magnetic efficiency;

a holder adapted to fix positions of the horizontal and vertical deflection coils and the ferrite core and insulate the horizontal and vertical deflection coils; and,

a magnetic material provided on an upper side and a lower side of a flange part formed at a screen side of the holder for canceling a magnetic field leaked from the horizontal deflection coil at the screen side of the holder, wherein the magnetic material is formed of ferrite selected from the group consisting of Ni—Zn ferrite, Mg—Zn ferrite, and Mn—Zn ferrite.

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